SAMSUNG

SAMSUNG DISPLAY

Product Information

DATE : 23. July. 2012

SAMSUNG TFT-LCD

MODEL **: LTA400HM23**

The information described in this specification is preliminary and can be changed without prior notice

Samsung Display Co . , LTD.

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* Revision History

Date	Rev. No	Page	Summary
23. July. 2012	000	All	First Issued

General Description

Description

LTA400HM23 is a color active matrix liquid crystal display (LCD) that uses amorphous silicon TFT(Thin Film Transistor) as switching components. This model is composed of a TFT LCD panel, a driver circuit and a back light unit.

The resolution of a 40.0" is 1920 x 1080 and this model can display up to 16.7million colors with wide viewing angle of 178° or higher in all directions. This panel is intended to support applications to provide a excellent performance for Flat Panel Display such as Home-alone multimedia TFT-LCD TV and high definition TV

Features

- RoHS compliance (Pb-free)
- High contrast ratio & aperture ratio with wide color gamut
- SPVA(Super Patterned Vertical Align) mode
- Wide viewing angle (typ.178°)
- High speed response
- HD resolution (16:9)
- Low Power consumption
- Direct Type LED (Light Emitted Diode) BLU
- DE (Data Enable) mode
- 2ch LVDS (Low Voltage Differential Signaling) interface (2pixel/clock)

General Information

Items	Specification	Unit	Note
Module Size	914.4 (H_{Typ}) x 530.6 (V_{Typ})	mm	$\pm$1.0mm
	37 (D_{Max})		
Weight	6200 (Typ.)	g	
Pixel Pitch	0.46125(H) x 0.15375(W)	mm	
Active Display Area	885.6 (H) x 498.15 (V)	mm	
Surface Treatment	Anti-Glare Haze 5.5%, Hard coating (2H)	-	
Display Colors	8 bit – 16.7 M	color	
Number of Pixels	1920 x 1080	pixel	
Pixel Arrangement	RGB Horizontal stripe		
Display Mode	Normally Black		
Luminance of White	300 (Typ.)	cd/m^2	

1. Absolute Maximum Ratings

If the condition exceeds maximum ratings, it can cause malfunction or unrecoverable damage to the device.

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	GND-0.3	13.2	V	(1)
Dimming Control	Max. Lum	-	5	V	
Storage temperature	T_{STG}	-20	60	℃	(2)
Operating temperature	T_{OPR}	0	50	℃	
Shock (non - operating)	X,Y,Z	-	50	G	(3)
Vibration (non - operating)	V_{NOP}	-	1.5	G	(4)

Note (1) Ta= 25 $\pm$ 2 °C
   (2) Temperature and relative humidity range are shown in the figure below.
      a. Ta ≤ 39 °C , Relative Humidity is max 90 %
      b. Ta > 39 °C , Relative Humidity is less than 90%
      c. No condensation

Relative Humidity(%RH)

(39, 90)

Operating Range

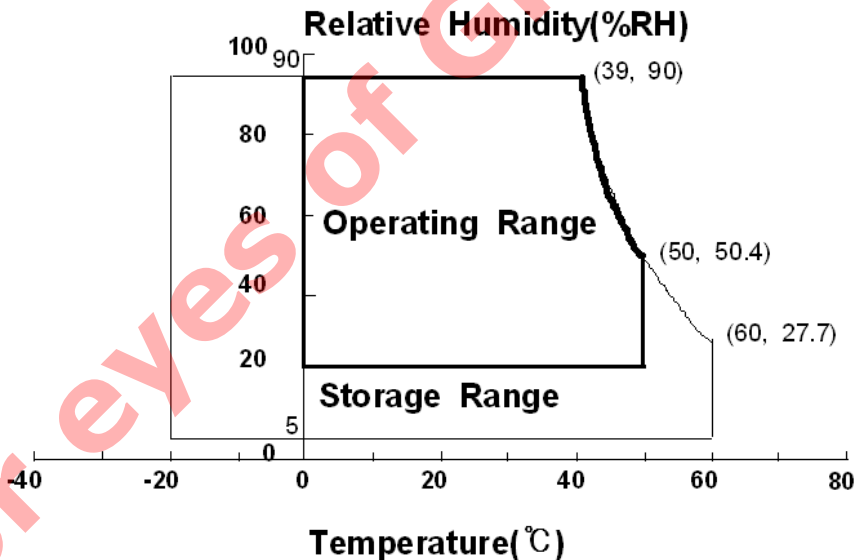(50, 50.4)

(60, 27.7)

Storage Range

Temperature(℃)

Fig. Temperature and Relative humidity range

(3) 11ms, sine wave, one time for $\pm$X, $\pm$Y, $\pm$Z axis
(4) 10-300 Hz, Sweep rate 10min, 30min for X,Y,Z axis

2. Optical Characteristics

The optical characteristics should be measured in a dark room or equivalent condition.

Measuring equipment ( ) : equipment maker
: BM-7(TOPCON), PR-650(Photo Research), SR3(TOP CON)

(Ta = 25 $\pm$ 2°C, VDD=12V, fv= 60Hz, f_{DCLK} = 148.5 MHz, If = 400mA, Dim.duty 100%)

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Contrast Ratio (Center of screen)		C/R		-	5000	-		(1) SR-3
Response Time	G-to-G (2D)	Tg		-	8	20	msec	(3) BM-7, RD-80S
Luminance of White (Center of screen)		Y_L		260	300	-	cd/m²	(4) SR-3
Color Chromaticity (CIE 1931)	Red	Rx	Normal θL,R =0 θU,D =0 Viewing Angle	TYP. -0.03	0.640	TYP. -0.03		(5),(6) PR650, SR-3 Center Point
		Ry			0.338			
	Green	Gx			0.312			
		Gy			0.616			
	Blue	Bx			0.150			
		By			0.054			
	White	Wx			0.275			
		Wy			0.285			
Color Gamut		-		-	70	-	%	(5) SR-3
Color Temperature		-		-	11,000	-	K	
Typ. Viewing Angle	Hor.	θL	C/R≥10	75	89	-	Degree	(6) EZ-Contrast
		θR		75	89	-		
	Ver.	θU		75	89	-		
		θD		75	89	-		
White Brightness Uniformity (9 Points)		B_{uni}		-	-	30	%	(2) SR-3

- Test Equipment Setup

The measurement should be executed in a stable, windless and dark room between 40min and 60min after lighting the back light at the given temperature for stabilization of the back light. This should be measured in the center of screen.

Environment condition : Ta = 25 $\pm$ 2 °C

Photo detector	Field
SR-3	1°
RD-80S	. 2°

Photo detector

Field

D : 50㎝

TFT - LCD Module

LCD Panel

The center of the screen
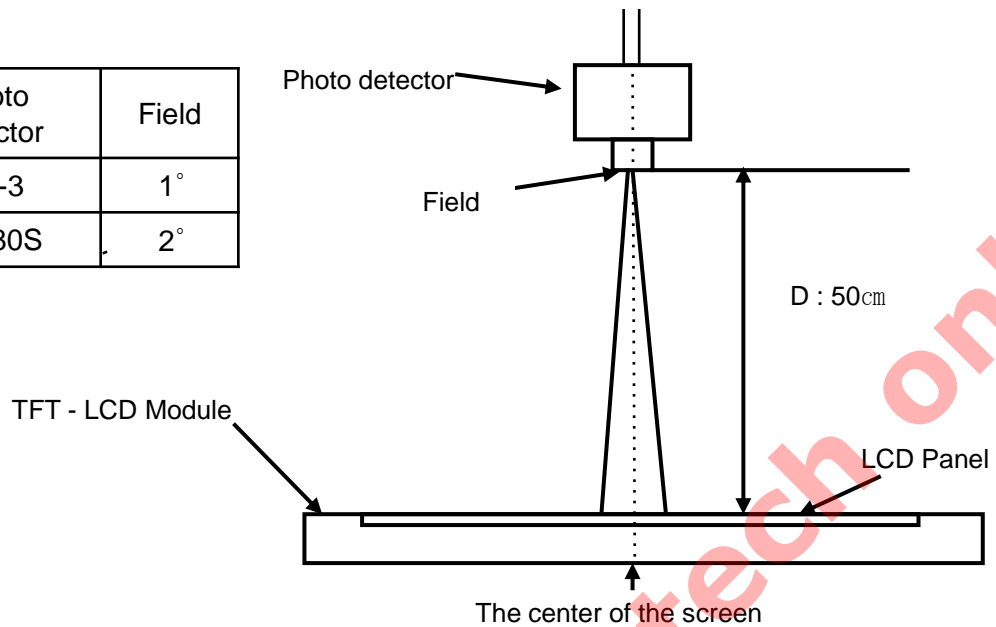
- Definition of test point

Active Area

○ Test Point
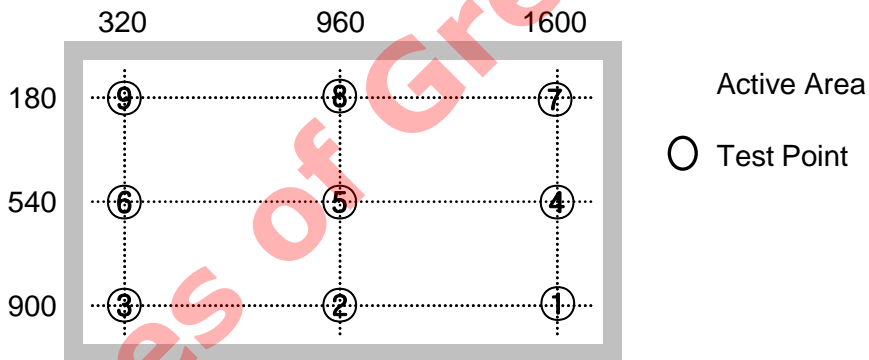
Note (1) Definition of Contrast Ratio (C/R)
: Ratio of gray max (Gmax) & gray min (Gmin) at the center point ⑤ of the panel

$$C/R = \frac{G\max}{G\min}$$

Gmax : Luminance with all pixels white
Gmin : Luminance with all pixels black

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Note (2) Definition of 9 points brightness uniformity (Test pattern : Full White)

$$Buni = 100 * \frac{(B\max - B\min)}{B\max}$$

Bmax : Maximum brightness
Bmin : Minimum brightness

Note (3) Definition of Response time : Average of T_R, T_F
(data is 8 x 8 Gray table, excluding 0 to 255Gray)

| Display data | Black (data off) | White (data on) | Black (data off) |

Optical Instruments Response

T_R T_F

100%
90%

10%
0%

TIME
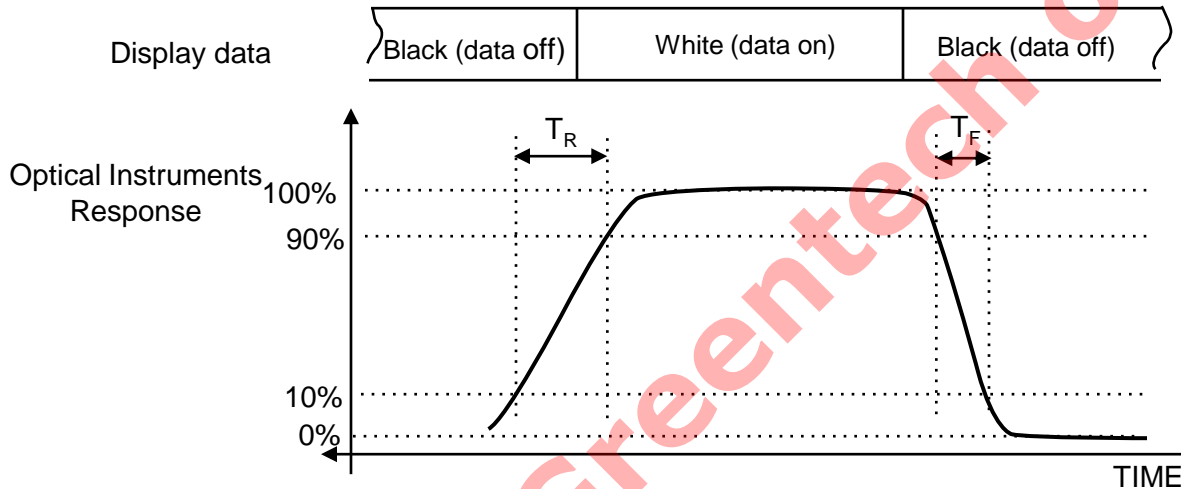
Note (4) Definition of Luminance of White : Luminance of white at center point ⑤

Note (5) Definition of Color Chromaticity (CIE 1931)
Color coordinate of Red, Green, Blue & White at center point ⑤

Note (6) Definition of Viewing Angle at center point
: Viewing angle range (C/R ≥10)

θ_U
θ_R
θ_L
θ_D

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3. Electrical Characteristics

3.1 TFT LCD Module

The connector for display data & timing signal should be connected.

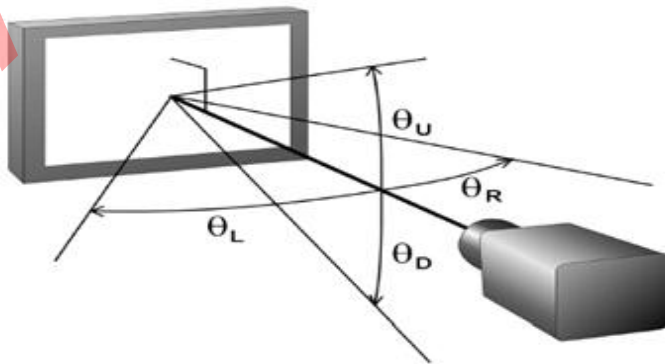Ta = 25°C $\pm$ 2 °C

Item		Symbol	Min.	Typ.	Max.	Unit	Note
Voltage of Power Supply		V_{DD}	10.8	12.0	13.2	V	(1)
	(a) Black		-	725	850	mA	
	(b) White	I_{DD}	-	730	850	mA	(2),(3)
	(c) Checker		-	1060	1200	mA	
Vsync Frequency		f_V	48	60	62	Hz	
Hsync Frequency		f_H	50	67.5	73	kHz	
Main Frequency		f_{DCLK}	130	148.5	155	MHz	
Rush Current		I_{RUSH}	-	-	3	A	(4)

Note (1) The ripple voltage should be controlled under 10% of V_{DD}.
   (2) fV=60Hz, fDCLK =148.5MHz, V_{DD} = 12.0V, DC Current.
   (3) Power dissipation check pattern (LCD Module only)
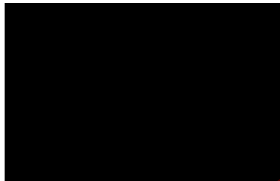
a) Black Pattern   b) White Pattern   c) Checker
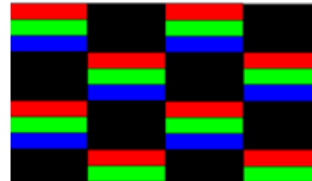
(4) Measurement Conditions

T_{RUSH} ≥ 470μs
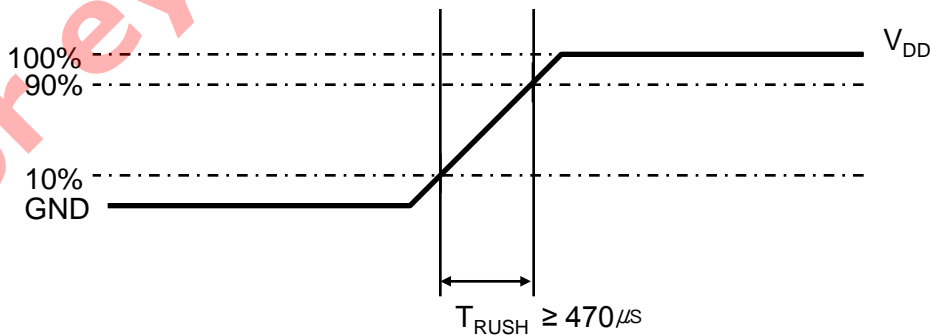
Rush Current I_{RUSH} can be measured when T_{RUSH}. is bigger then 470μs.

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3.2 Back Light Unit

The back light unit contains Direct type White LEDs (Light Emitting Diode)

Ta=25 $\pm$ 2°C

LCD Module

Converter CNT

Signal & Power CNT
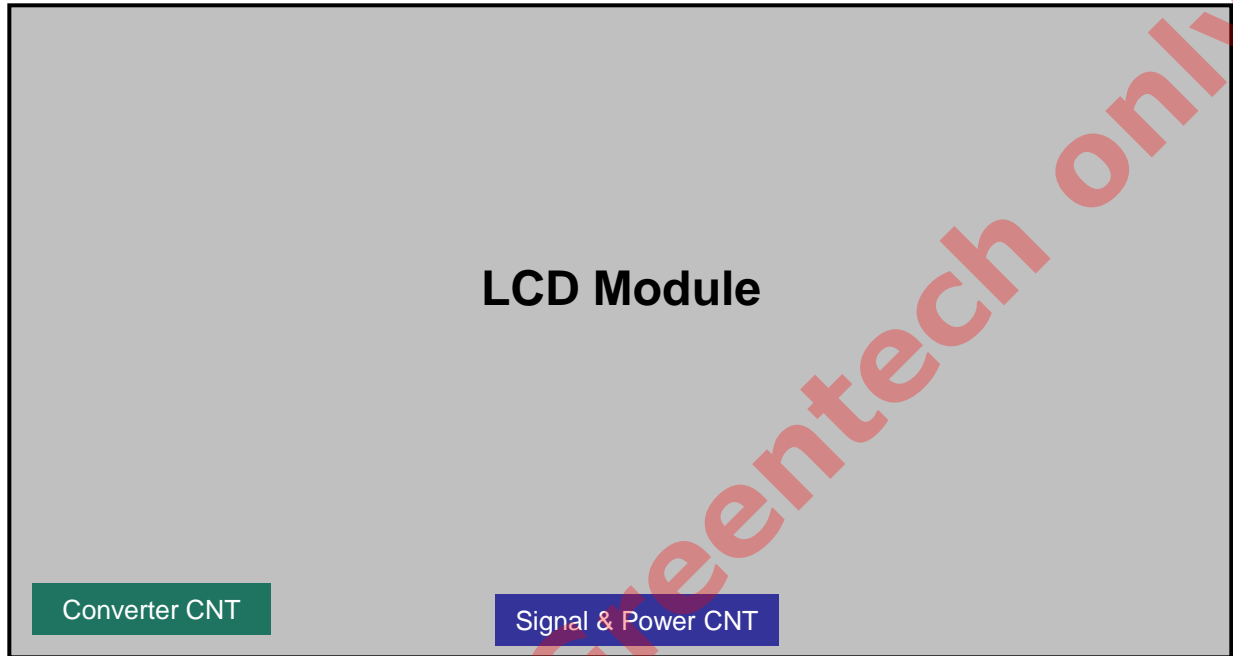
Item	Min.	Typ.	Max.	Unit	Note
Operating Life Time	30000	-	-	Hour	

Note (1) It is defined as the time to take until the brightness reduces to 50% of its original value.

[Operating condition : Ta = 25±2℃]

3.3 Converter Input Condition & Specification

Items	Symbol	Conditions	Specifications			Unit	Note
			Min.	Typ.	Max.		
Input Voltage	Vin	-	22	24	26	V	Ta=25±2 °C
Input Rush Current	I_{RUSH}	Vin=24.0V Vdim =3.3V	-	-	3.66	A	
Output Current	$I_{LED, N}$	Vin=21.6 ~ 26.4V Vdim =3.3V	380	400	420	mA	
Backlight On/Off	ON	Vin=24.0 V	3	-	5.25	V	Pin(#12)
	OFF	Vin=24.0 V	0	-	0.4		
Dimming Range	V_{DIM}	Vin :22~26V	0	-	3.3	V	
Dimming Duty Output	D max	Vin=24V Dim:3.3V	-	-	100	%	(2)
	D min	Vin=24V Dim:0V	10	-	-		
External Dimming Duty Range	EX_Dim	Min	10	-	100	%	
External Dimming Frequency Range	F_{EX_PWM}	Vin=22.0~26.0 V	95	120	185	Hz	Dim Pin(#14) : Floating, (4)
External Dimming Signal Level	V_{PWM}	High (ON)	3	-	5.25	V	
		Low (Off)	0	-	0.4		

Note) Power Consumption is measured when 300 [cd/m] of luminance which is the typical luminance.

(1) All data is measured after 60min warm-up.
(2) only use #Pin 13
(3) only use #Pin14
(4) External PWM frequency should be synchronized with SET frequency

- Additional Appendix for Supply Current & Power consumption

ITEM	SYMBOL	CONDITION	SPECIFICATION			UNIT	NOTE
			MIN	TYP	MAX		
Input Current	Iovershoot, 2D	Vin=24V, dim=max	-	2.91	3.00	Adc	Maximum current after turn-on
	Isaturation,2D		-	2.90	2.98	Adc	Saturation current after 1hr aging

4. Input Terminal Pin Assignment

4.1. Input Signal & Power   Connector : FI-RE51S-HF (JAE)

Pin	Symbol	Description	Pin	Symbol	Description
1	12V	DC power supply	26	RE[0]P	Even LVDS Signal +
2	12V	DC power supply	27	RE[1]N	Even LVDS Signal -
3	12V	DC power supply	28	RE[1]P	Even LVDS Signal +
4	12V	DC power supply	29	RE[2]N	Even LVDS Signal -
5	12V	DC power supply	30	RE[2]P	Even LVDS Signal +
6	NC	NOTE1	31	GND	Ground
7	GND	Ground	32	ROCLK-	Even LVDS Clock -
8	GND	Ground	33	ROCLK+	Even LVDS Clock +
9	GND	Ground	34	GND	Ground
10	RO[0]N	Odd LVDS Signal -	35	RE[3]N	Even LVDS Signal -
11	RO[0]P	Odd LVDS Signal +	36	RE[3]P	Even LVDS Signal +
12	RO[1]N	Odd LVDS Signal -	37	NC	NOTE1
13	RO[1]P	Odd LVDS Signal +	38	NC	
14	RO[2]N	Odd LVDS Signal -	39	GND	Ground
15	RO[2]P	Odd LVDS Signal +	40	NC	
16	GND	Ground	41	NC	
17	ROCLK-	Odd LVDS Clock -	42	NC	NOTE1
18	ROCLK+	Odd LVDS Clock +	43	NC	
19	GND	Ground	44	NC	
20	RO[3]N	Odd LVDS Signal -	45	LVDS_SEL	NOTE2
21	RO[3]P	Odd LVDS Signal +	46	NC	
22	NC	NOTE1	47	NC	
23	NC		48	NC	
24	GND	Ground	49	NC	
25	RE[0]N	Even LVDS Signal -	50	NC	
			51	NC	NOTE1

Note1) No Connection: These PINS are used only for SAMSUNG. (DO NOT CONNECT)

Note(2) LVDS OPTION : If this PIN is HIGH (3.3 V) → Normal LVDS format

LOW (GND) → JEIDA LVDS format

Pull down resistor : 47Kohm

SEQUENCE : On = V$_{DD}$(T1) ≥ LVDS Option ≥ Interface Signal(T2)

OFF = Interface Signal(T3) ≥ LVDS Option

LVDS Option Sequence
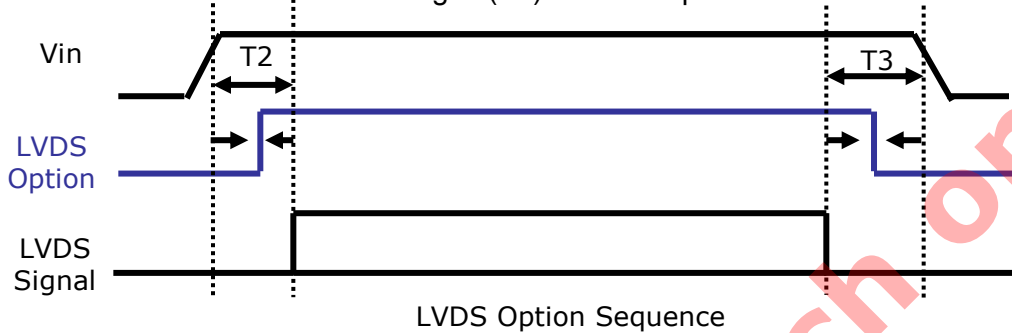
Note (3) Signal level of LVDS selection

	Min	Typ	Max
High	2.8V	-	3.6 V
Low	0 V	-	0.4V

Note(4) Pin number starts from Left side

PCB

Pin No. 1   Pin No. 51

#1   #51

#1   #51
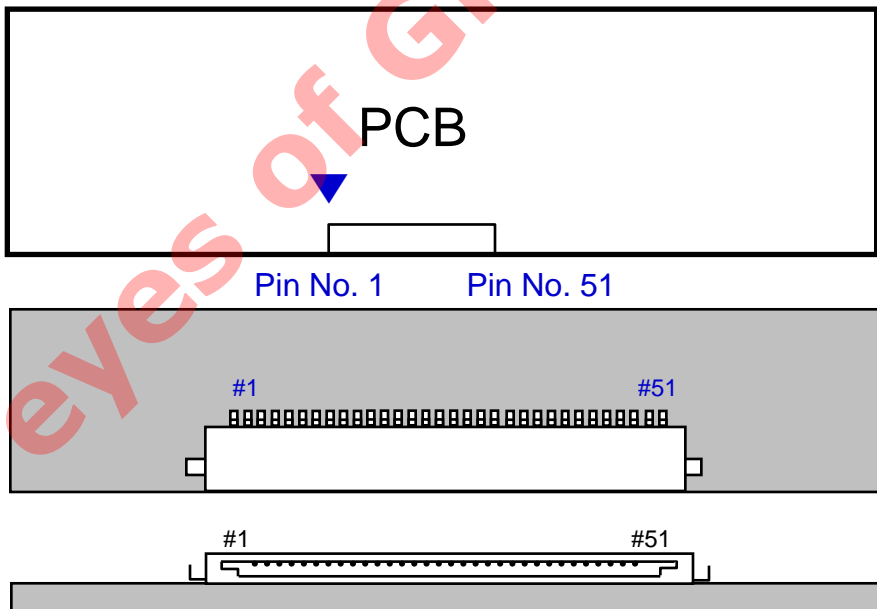
Fig. Connector diagram

a. Power GND pins should be connected to the LCD's metal chassis.

b. All power input pins should be connected together.

c. All NC pin should be separated from other signal or power.

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4.2. converter Input Pin Configuration

Connector : Yeon-ho, 20022WS-H145J

Pin No.	Pin Configuration(FUNCTION)
	Master
1	24 V
2	24 V
3	24 V
4	24 V
5	24 V
6	GND
7	GND
8	GND
9	GND
10	GND
11	No connection
12	ENA [converter on/off control signal] *Note(2)
13	Analog Dimming Control [0V:Min, 3.3V:Max] *Note(1)
14	External PWM [10~100%] *Note(1), Note(2)

Note(1) If use Dimming Control, Pin 14 Must be N.C
         If use External PWM, Pin 13 Must be N.C
Note(2) Pin 12 has Pull down register 100Kohm, Pin 13/14 has Pull up register 100Kohm

4.3. converter Input Power Sequence

Vin (24V)

0.02sec [Min]

Dimming Control

External PWM

0.5sec [Min]   0.2sec [Min]

Backlight On/Off   0.5sec [Min]

0sec [Min]   0 sec [Min]
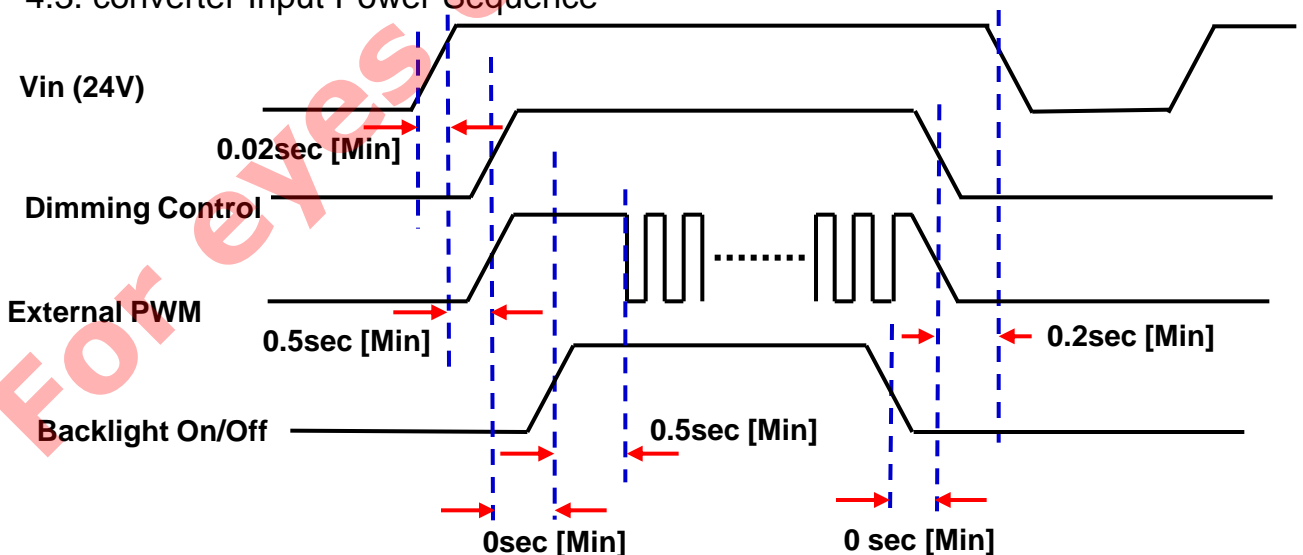
Note) SEQUENCE : ON = Vin(24V) > Dimming Control ≥ Backlight On/Off
         OFF = Backlight On/Off ≥ Dimming Control > Vin(24V)

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4.4 LVDS Interface
   - LVDS Receiver : Tcon (merged)
   - Data Format

	LVDS pin	JEIDA -DATA	VESA -DATA
TxOUT/RxIN0	TxIN/RxOUT0	R2	R0
	TxIN/RxOUT1	R3	R1
	TxIN/RxOUT2	R4	R2
	TxIN/RxOUT3	R5	R3
	TxIN/RxOUT4	R6	R4
	TxIN/RxOUT6	R7	R5
	TxIN/RxOUT7	G2	G0
TxOUT/RxIN1	TxIN/RxOUT8	G3	G1
	TxIN/RxOUT9	G4	G2
	TxIN/RxOUT12	G5	G3
	TxIN/RxOUT13	G6	G4
	TxIN/RxOUT14	G7	G5
	TxIN/RxOUT15	B2	B0
	TxIN/RxOUT18	B3	B1
TxOUT/RxIN2	TxIN/RxOUT19	B4	B2
	TxIN/RxOUT20	B5	B3
	TxIN/RxOUT21	B6	B4
	TxIN/RxOUT22	B7	B5
	TxIN/RxOUT24	HSYNC	HSYNC
	TxIN/RxOUT25	VSYNC	VSYNC
	TxIN/RxOUT26	DEN	DEN
TxOUT/RxIN3	TxIN/RxOUT27	R0	R6
	TxIN/RxOUT5	R1	R7
	TxIN/RxOUT10	G0	G6
	TxIN/RxOUT11	G1	G7
	TxIN/RxOUT16	B0	B6
	TxIN/RxOUT17	B1	B7
	TxIN/RxOUT23	RESERVED	RESERVED

4.5 Input Signals, basic display colors and gray scale of each color

COLOR	DISPLAY (8bit)	R0	R1	R2	R3	R4	R5	R6	R7	G0	G1	G2	G3	G4	G5	G6	G7	B0	B1	B2	B3	B4	B5	B6	B7	GRAY SCALE LEVEL
					RED								GREEN								BLUE					
BASIC COLOR	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	BLUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	-
	GREEN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	-
	CYAN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
	RED	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-
	MAGENTA	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	-
	YELLOW	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	-
	WHITE	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	-
GRAY SCALE OF RED	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R0
	DARK ↑	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R1
		0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R2
		:	:	:	:	:	:			:	:	:	:	:	:			:	:	:	:	:	:			R3~R252
	↓	:	:	:	:	:	:			:	:	:	:	:	:			:	:	:	:	:	:			
	LIGHT	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R253
		0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R254
	RED	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	R255
GRAY SCALE OF GREEN	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G0
	DARK ↑	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G1
		0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G2
		:	:	:	:	:	:			:	:	:	:	:	:			:	:	:	:	:	:			G3~G252
	↓	:	:	:	:	:	:			:	:	:	:	:	:			:	:	:	:	:	:			
	LIGHT	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G253
		0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G254
	GREEN	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	G255
GRAY SCALE OF BLUE	BLACK	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	B0
	DARK ↑	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	B1
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	B2
		:	:	:	:	:	:			:	:	:	:	:	:			:	:	:	:	:	:			B3~B252
	↓	:	:	:	:	:	:			:	:	:	:	:	:			:	:	:	:	:	:			
	LIGHT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	1	1	B253
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	B254
	BLUE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	B255

Note) Definition of Gray :

Rn : Red Gray, Gn : Green Gray, Bn : Blue Gray (n = Gray level)

Input Signal : 0 = Low level voltage, 1 = High level voltage

5. Interface Timing

5.1 Timing Parameters (DE mode)

SIGNAL	ITEM	SYMBOL	MIN.	TYP.	MAX.	Unit	NOTE
Clock	Frequency	$1/T_C$	130	148.5	155	MHz	-
Hsync		F_H	50	67.5	73	KHz	-
Vsync		F_V	48	60.0	62	Hz	-
Vertical Display Term	Active Display Period	T_{VD}	-	1080	-	Lines	-
	Vertical Total	T_V	1092	1125	1380	Lines	-
Horizontal Display Term	Active Display Period	T_{HD}	-	1920	-	Clocks	-
	Horizontal Total	T_H	2090	2200	2350	clocks	-

Note) This product is DE mode. But the Hsync & Vsync signal must be inputted
   (1) Test Point : TTL control signal and CLK at LVDS Tx input terminal in system
   (2) Internal VDD = 3.3V
   (3) Spread spectrum
      - Modulation rate (max) : $\pm$ 1.5 % , Modulation Frequency : Min 30KHz

5.2 LVDS Input Data Characteristics

ITEM		SYMBOL	Min.	Typ.	Max.	UNIT	NOTE
Input Data Position	F_{IN}=85MHz	t_{RSRM}	-	-	400	ps	
		t_{RSLM}	-400	-	-	ps	
Input common mode voltage		V_{CM}	V_{SSL}+0.6	1.2	V_{DDL}-0.6	V	-
Differential Input Voltage		$|V_{ID}|$	100	-	600	mV	-

Note) When the skew is measured the Spread Spectrum should be 0%

5. 3 Timing diagrams of interface signal (DE mode)

MODEL	LTA400HM23	Doc. No	06-000-G-20120723	Page	18 / 26
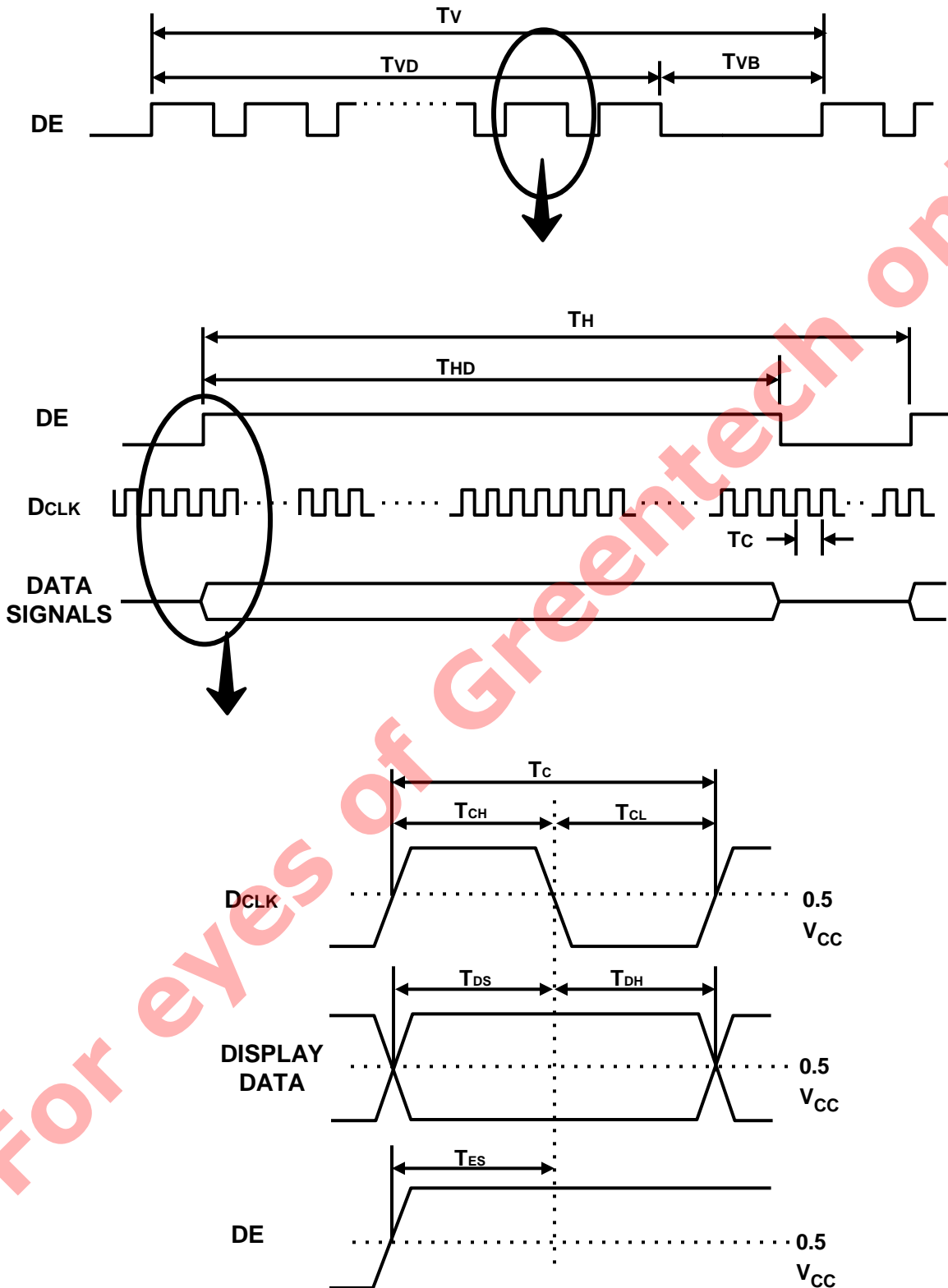
5.4 Power ON/OFF Sequence

  To prevent a latch-up or DC operation of the LCD Module, the power on/off
sequence should be as the diagram below.
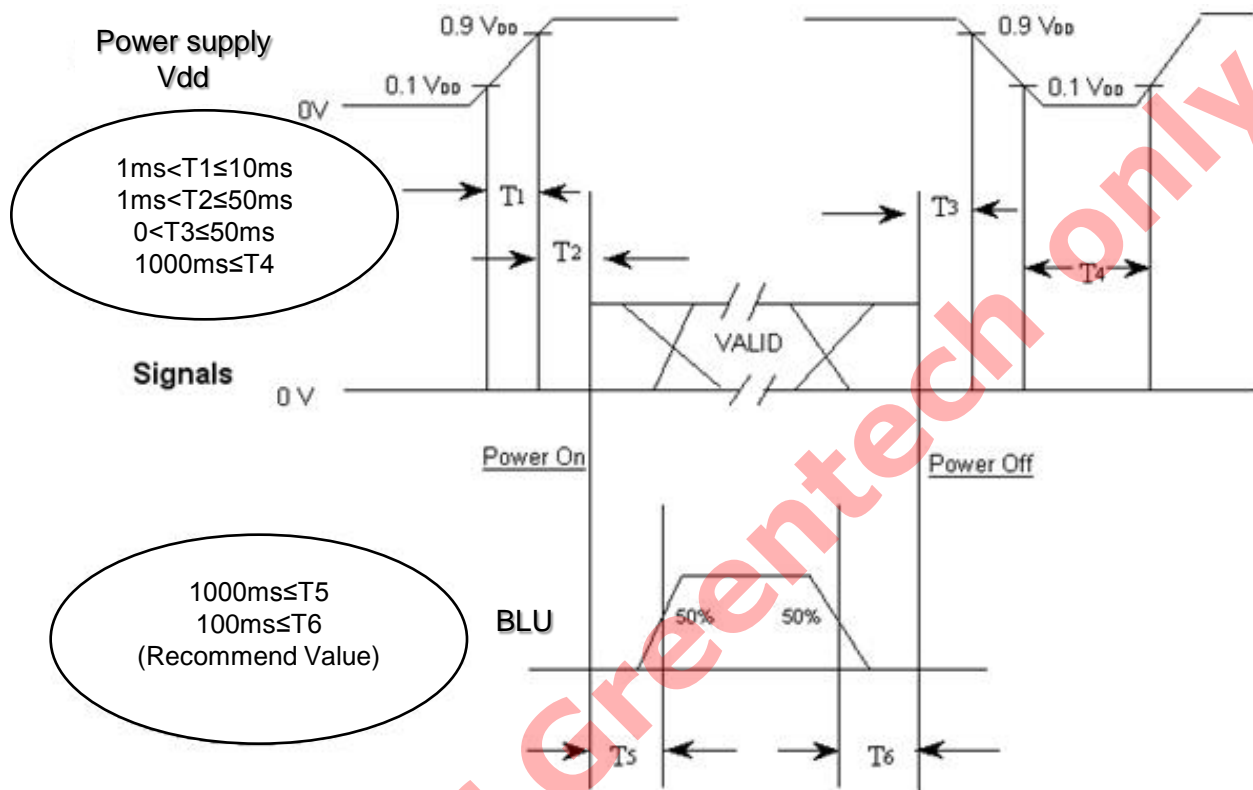
T1 : V_{DD} rising time from 10% to 90%
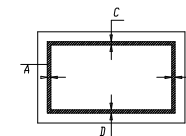T2 : The time from V_{DD} to valid data at power ON.
T3 : The time from valid data off to V_{DD} off at power Off.
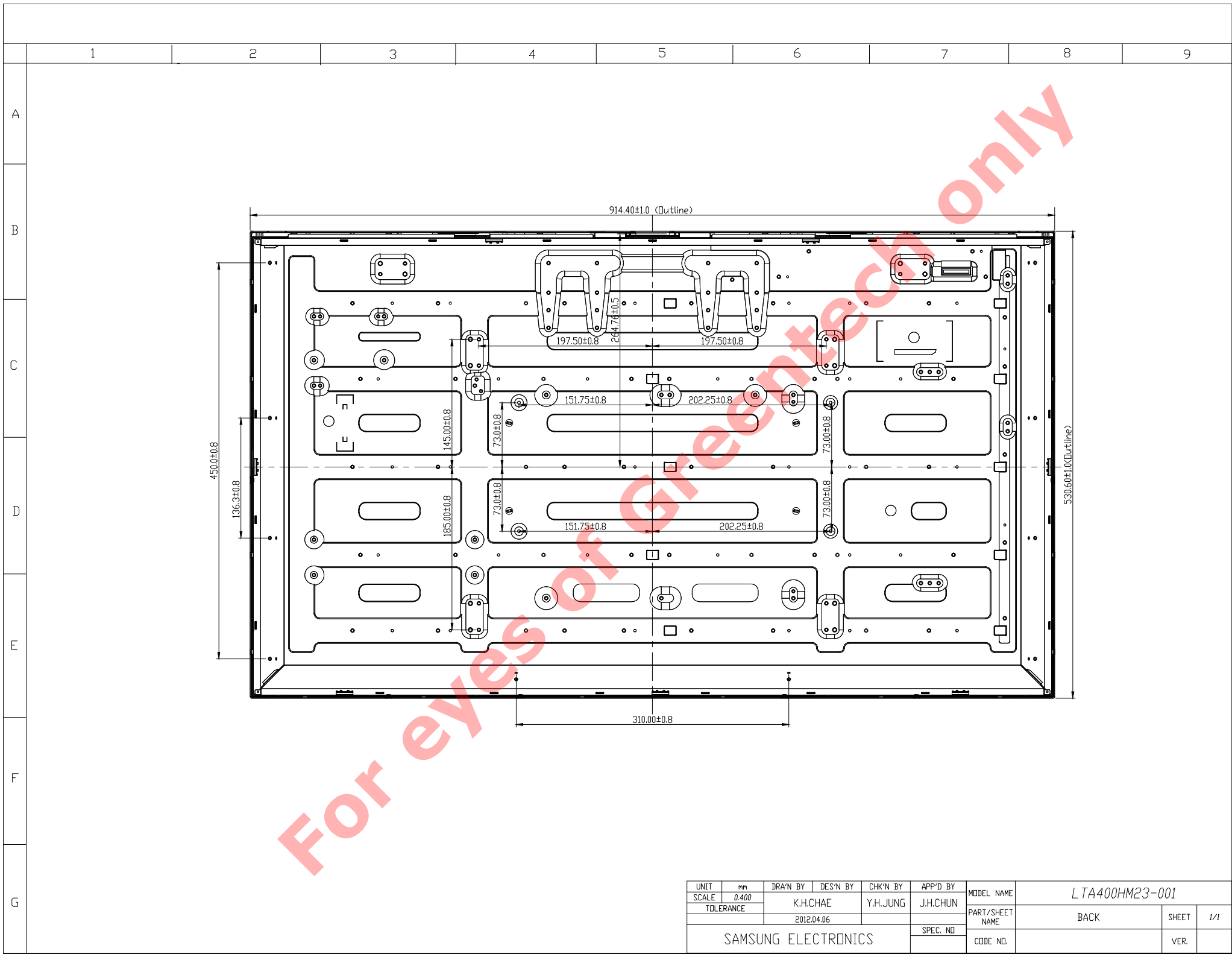T4 : V_{DD} off time for Windows restart
T5 : The time from valid data to B/L enable at power ON.
T6 : The time from valid data off to B/L disable at power Off.

- The supply voltage of the external system for the module input should be the same
  as the definition of V_{DD}.
- Apply the LED voltage within the LCD operation range. When the back light turns on
  before the LCD operation or the LCD turns off before the back light turns off,
  the display may momentarily show abnormal screen.
- In case of V_{DD} = off level,
  please keep the level of input signals low or keep a high impedance.
- T4 should be measured after the module has been fully discharged between power off
  and on period.
- Interface signal should not be kept at high impedance when the power is on.
- In Case T5 is less than 1000msec and T6 is less than 100msec,
  garbage display can be seen. (It is not related to electrical function issue, just for
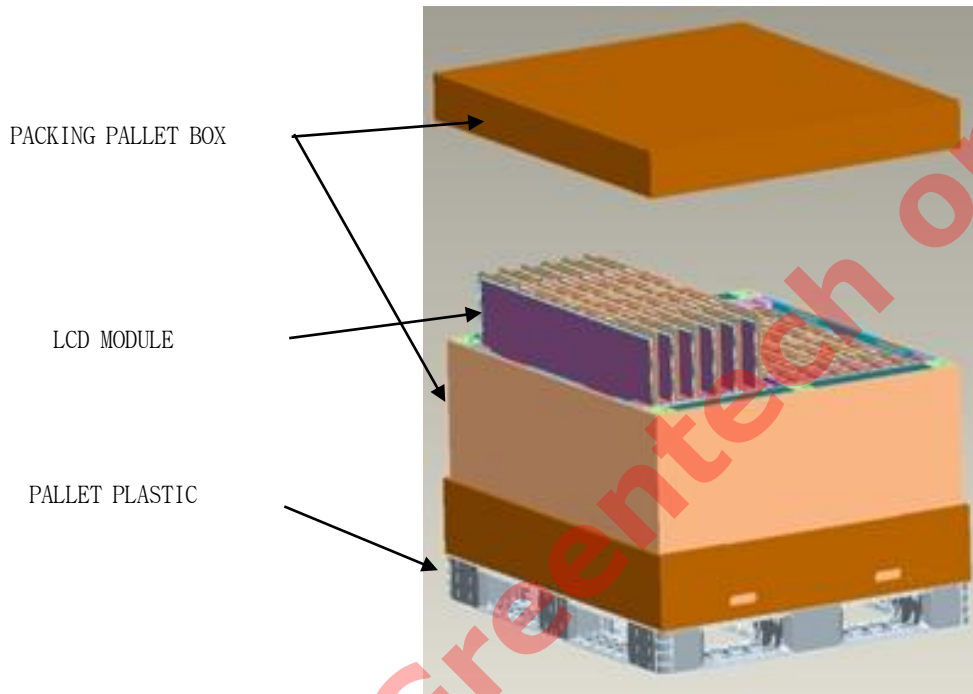 recommendation to prevent garbage display)

* NOTE
1. BACKLIGHT : D_LED 43ea (9-8-9-8-9)
2. CONNECTOR SPECIFICATION
   - POWER CONNECTOR
      >. MAKER :
      >. PART NO. :
   - LVDS INPUT CONNECTOR(51PIN)
      >. MAKER :
      >. PART NO. :
   - LVDS INPUT CONNNECTOR(41PIN)
      >. MAKER :
      >. PART NO. :
3. USERHOLE
   - TAP SIZE & TOLERANCE DESIGNED
     FOR GENERAL PURPOSE METRIC
   - SCREW THREAD : GENERAL GRADE OF "KS B 0211"
      - ALLOWD SCREW TORQUE
        >. M3 TAP : 6.0 kgf.cm MAX
   - (SCREW) REPEATED INSERTION WARRANTY : 5TIMES
4. GAP BETWEEN TOP CHASSIS AND GLASS IS 0.1mm
5. WEIGHT : 6.2 (TYP)/6.8KG (MAX)
6. BLACK MATRIX SPEC

   - $|A - B| \leq 0$ mm
   - $|C - D| \leq 0$ mm

914.40±1.0 (Outline)
894.60±1.0(Bezel Open)
15.00±0.5
3.775
9.90±0.5
4.50
Gate 18ea
885.60 (Active area)
498.15 (Active area)
Active center
505.70±1.0(Bezel Open)
530.60±1.0(Outline)
4.50
9.90±0.5
3.775
9.90±0.5
16.75±1.0
checking Hole 3ea (Thermal pad)
35.0±2.0

UNIT	mm	DRA'N BY	DES'N BY	CHK'N BY	APP'D BY	MODEL NAME	LTA400HM23		
SCALE	0.300	K.H.CHAE	Y.H.JUNG	J.H.CHUN					
TOLERANCE						PART/SHEET NAME	FRONT	SHEET	1/1
		2012.04.06				SPEC. NO			
SAMSUNG ELECTRONICS						CODE NO.		VER.	

914.40±1.0 (Outline)

264.76±0.5

197.50±0.8   197.50±0.8

151.75±0.8   202.25±0.8

145.00±0.8

73.0±0.8

73.00±0.8

450.0±0.8

136.3±0.8

185.00±0.8

73.0±0.8

73.00±0.8

151.75±0.8   202.25±0.8

530.60±1.0(Outline)

310.00±0.8

UNIT	mm	DRA'N BY	DES'N BY	CHK'N BY	APP'D BY	MODEL NAME		LTA400HM23-001		
SCALE	0.400	K.H.CHAE		Y.H.JUNG	J.H.CHUN					
TOLERANCE						PART/SHEET NAME		BACK	SHEET	1/1
		2012.04.06			SPEC. NO					
SAMSUNG ELECTRONICS						CODE NO.			VER.	

7. PACKING

7.1 Carton (Internal Package)

PACKING PALLET BOX

LCD MODULE

PALLET PLASTIC

7.2 Packing Specification

Item	Specification	Remark
LCD Packing	13ea / Box (Packing-Pallet Box)	1. 6.2 Kg / LCD (24ea) 2. 18.5 Kg / Packing Box (1set) > Packing Box Material : Paper 3. 10 g/EA, 4 EA/Module, Cobalt-dichloride-free
Pallet	1 Box / Pallet	1. Pallet weight = 4.9 kg > Pallet Material : HDPE
Packing Direction	Vertical	
Total Pallet Size	L x W x height	1150mm(L) x 850mm(W) x 1071mm(height)
Total Pallet Weight	114.12 kg	Module(80.6kg) + Desiccant(0.52kg) Pallet(14.5kg) + Packing SET(18.5kg)

8. Marking & Others

A nameplate bearing followed by is affixed to a shipped product at the specified location on each product.
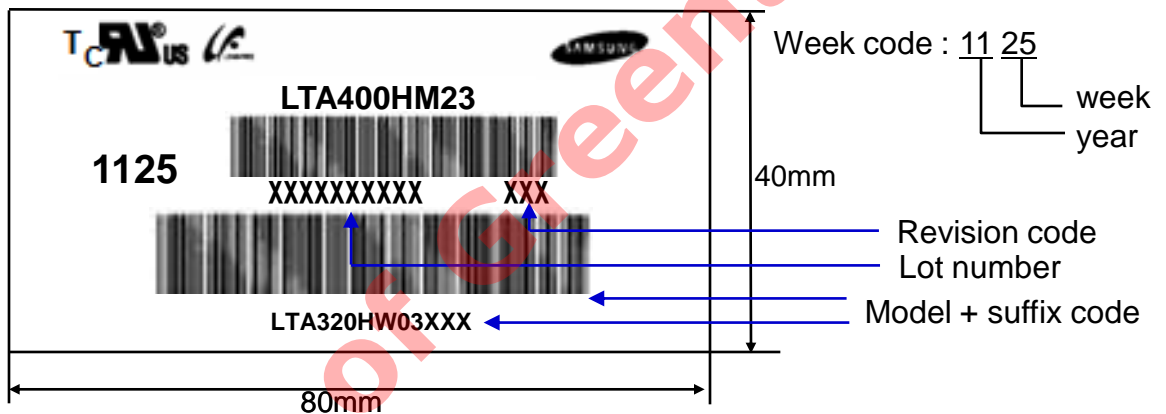
(1) Part number : LTA400HM23
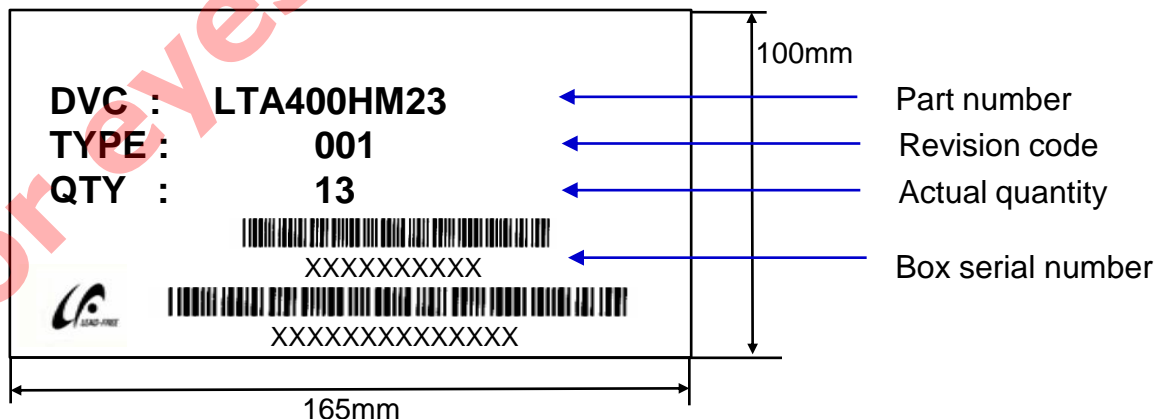(2) Revision: Three letters
(3) Lot number : X X X X XXX XX X

Cell Position No. (In the Glass)
Glass No. (In the one Lot)
Lot No. (Glass)
Month
Year (Note1)
Product code
Line

(4) Nameplate Indication

LTA400HM23

1125

XXXXXXXXX   XXX

LTA320HW03XXX

Week code : 11 25

week
year

40mm

Revision code
Lot number
Model + suffix code

80mm

(5) Packing box attach

DVC : LTA400HM23
TYPE : 001
QTY : 13

XXXXXXXXX

XXXXXXXXXXXXX

100mm

Part number
Revision code
Actual quantity

Box serial number

165mm
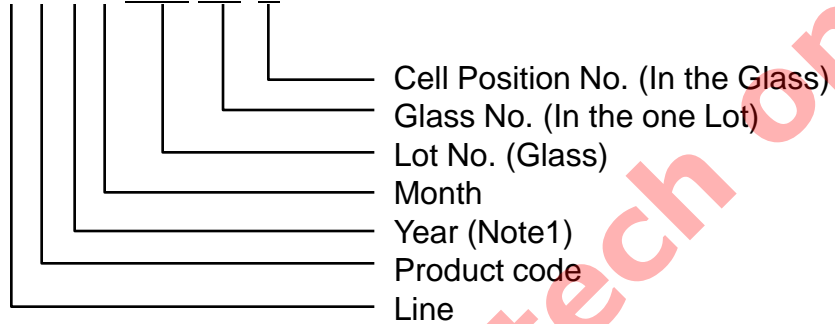
(6) Others
1. After service part
LED bar can not be replaced because of the narrow bezel structure.

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9. General Precautions

9.1 Handling

(a) When the module is assembled, it should be attached to the system firmly
using all mounting holes. Be careful not to twist and bend them.

(b) Module should be disconnected from power before it is assembled or disassembled.

(c) Refrain from strong mechanical shock and / or any force to the module.
In addition to damage, this may cause improper operation or damage to the module
and LED back light.

(d) Note that polarizers are very fragile and could be damage easily.
Do not press or scratch the surface harder than a HB pencil lead.

(e) Wipe off water droplets or oil immediately. If you leave the droplets for a long
time, staining or discoloration may occur.

(f) If the surface of the polarizer is dirty, clean it using absorbent cotton or soft cloth.

(g) Desirable cleaners are water, IPA(Isopropyl Alcohol) or Hexane.
Do not use Ketone type materials(ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid
or Methyl chloride. It might do permanent damage to the polarizer due to chemical
reaction.

(h) If the liquid crystal material leaks from the panel, it should be kept away
from the eyes or mouth . In case of contact with hands, legs or clothes, it must
be washed away with soap thoroughly.

(i) Protect the module from ESD (Electro-Static Discharge). Otherwise the ASIC IC or
semiconductor would be damaged.

(j) Use finger-stalls with soft gloves in order to keep display clean during the
incoming inspection and assembly process.

(k) Do not disassemble the module.

(l) Do not disassemble shield case of LVDS board

(m) Do not connect N.C pins. (Samsung internal use only)

(n) Protection film for polarizer on the module should be slowly peeled off just before use
so that the electrostatic charge can be minimized. Must put on antistatic glove while
handling a module

(o) Pins of Interface connector should not be touched directly with bare hands.

9.2 Package storage

We highly recommend to comply with the criteria in the table below.

ITEM	UNIT	Min.	Max.
Storage Temperature	(℃)	5	40
Storage Humidity	(%rH)	35	75
Storage Life	6 months		
Storage Condition	- The storage room should provide good ventilation and temperature control. - Products should not be placed on the floor, but on the Pallet away from a wall. - Prevent products from direct sunlight, moisture nor water; Be cautious of a build up of condensation. - Avoid other hazardous environment while storing goods. - If products delivered or kept in conditions of over the storage period of 3months, the recommended temperature or humidity range, we recommend you leave them at a temperature of 20℃ and a humidity of 50% for 24 hours.		

9.3 Operation

(a) Do not connect or disconnect the Module in the "Power On" condition.

(b) Power supply should always be turned on/off by the "Power on/off sequence"

(c) Module has high frequency circuits. Sufficient suppression to the electromagnetic interference should be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

(d) The cable between the back light connector and its Converter power supply should be connected directly with a minimized length. A longer cable between the back light and the Converter may cause lower luminance of lamp(LED) and may require higher startup voltage(Vs).

9.4 Operation Condition Guide

(a) The LCD product should be operated under normal conditions.
Normal condition is defined as below;
- Temperature : 20±15℃
- Humidity : 55±20%
- Display pattern : continually changing pattern (not stationary)

(b) If the product will be used in extreme conditions such as high temperature, humidity, display patterns or operation time etc.., It is strongly recommended to contact SEC for application engineering advice. Otherwise, its reliability and function may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, banks, stock market, and controlling systems.

9.5 Others

(a) Ultra-violet ray filter is necessary for outdoor operation.

(b) Avoid condensation of water. It may result in improper operation or disconnection of electrode.

(c) Do not exceed the absolute maximum rating value. (supply voltage variation, variation in part contents and environmental temperature and so on) Otherwise the module may be damaged.

(d) If the module keeps displaying the same pattern for a long period of time, the image may be "sticked" to the screen. To avoid image sticking, it is recommended to use a screen saver.

(e) This Module has its circuitry PCB's on the rear side and should be handled carefully in order not to be stressed.

(f) Please contact SEC in advance when you display the same pattern for a long time.

(g) Be cautious for detergents or water not to be permeated into the gap between the module and the panel when placing the module upside down.